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Attestation

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The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

99201087.6

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

I.L.C. HATTEN-HECKMAN

DEN HAAG, DEN
THE HAGUE,
LA HAYE, LE
29/03/00



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Page 2 de l'attestation

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SCA Research
3700 AJ Zeist
NETHERLANDS

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Hygienic superabsorbent material with odour-control

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Hygienic absorbent with odour control

(58)

[1] The present invention relates to a superabsorbent material for use in hygienic absorbent products such as diapers, sanitary napkins and the like, which has enhanced odour control and prevents bacterial growth and to a method of producing such material.

[2] Superabsorbent materials of various types are known in the art. Examples are crosslinked polyacrylates and polysaccharides grafted with polyacrylates. A problem related to the use of superabsorbent materials is the odour caused by urine components, which cause superabsorbent materials to become objectionable long before their maximum absorbing capacity has been used. As the malodorous compounds are often alkaline materials such as amines, it has been proposed to improve odour control by adding acids to the superabsorbent material. However, the use of acids has disadvantages in that acids will lead to skin irritation.

[3] It has been found that a superabsorbent material with improved odour control can be produced by incorporating in or combining with the superabsorbent material a non-acidic, alkali-neutralising compound selected from acid anhydrides, lactides, lactones and hydrolysable esters.

[4] Examples of suitable anhydrides include anhydrides of carboxylic acids, especially cyclic anhydrides of dicarboxylic or polycarboxylic acids such as succinic, glutaric, maleic, citraconic, phthalic acid. Lactides include cyclic esters of hydroxy acids, especially α -hydroxy acids such as glycolic acid and lactic acid (2,5-dioxo-1,4-dioxanes). Lactones include cyclic esters of hydroxy acids, especially γ - or δ -hydroxy acids such as butyrolactone, valerolactone, gluconolactone, glucuronolactone and corresponding lactones of other sugar acids. Examples of hydrolysable esters are cellulose acetate and starch acetate. The non-acidic compound can be chemically bound to the superabsorbent material in the form of esters such as acetylated cellulose.

[5] The amount of neutralising agent (acid anhydride, lactide and lactone) to be incorporated in or to be combined with the superabsorbent material can be 1-20 % by weight, preferably 3-12 % by weight with respect to the weight of the superabsorbing polymer. The amount of neutralising agent can also be expressed in molar equivalents. In particular the amount is 0.05-1 mmol, in particular 0.15-0.6 mmol per g of superabsorbing polymer.

[6] The superabsorbent materials according to the invention can be used for absorbing fluids, especially body fluids that may produce alkaline odorous components such as urine. As a model for human urine, so-called synthetic urine (SU) is used to study the effectiveness of the superabsorbent materials. The composition of SU is given in table 1 below:

5 [7]

Table 1

component	g/l	mmol/l
magnesium sulphate	0.42	3.5
potassium chloride	4.50	60
sodium chloride	7.60	130
urea	18.00	300
calcium sulphate dihydrate	0.34	2
potassium dihydrogen phosphate	3.54	26
disodium hydrogen phosphate	0.745	5.3
Triton X-100, 0.1%	1.00	
pH 5.9-6.0		

10 [8] Example 1: Baby diaper

In a baby diaper containing 13 g of polyacrylic acid as absorbent (Libero Maxi Girl), four different alkali-neutralising substances were placed under a non-woven of the diaper and on top of the pulp. 250 ml of SU was added to the diaper. After the addition, the pH was measured at six different places on the non-woven using a contact electrode, and the values were averaged. The results are summarised in table 2. It can be seen from the table that despite the high buffering capacity of the diaper (>75% of the polyacrylic acid being in the sodium salt form), the pH is lowered due to hydrolysis of the acid precursor.

[9]

Table 2

neutralising substance	amount (mg)	amount (mmol)	pH after 1 h	pH after 2 h	pH after 5 h
none	—	—	5.75	5.81	5.92
lactide	577	4.0	5.84	5.80	5.47
δ-gluconolactone	1430	8.0	5.96	5.85	5.33
maleic anhydride	600	6.1	5.70	n.d.	5.43
citric acid	801	4.0	5.73	5.85	5.32

[10] Example 2: Sanitary napkin

In a sanitary napkin (Libresse) containing CTMP (chemically treated mechanical pulp) as absorbent, three different alkali-neutralising substances were placed in the middle of the CTMP of the napkin. 15 ml of SU was added to the napkin. After the addition of the urine, the pH was measured as six different places on the non-woven using a contact electrode, and the values were averaged. The results are summarised in the following table 3. The table shows that addition of an acid lowers the pH quickly, whereas the same amount of (maleic) anhydride results in a slower pH decrease.

[11]

Table 3

neutralising substance	amount (mg)	amount (mmol)	pH after 2 h	pH after 5 h
none	—	—	5.76	5.67
lactide	34	0.23	4.51	4.56
maleic anhydride	23	0.23	5.36	4.32
citric acid	49	0.23	3.98	3.80

Claims

(58)

1. Superabsorbent material comprising a non-acidic compound selected from acid anhydrides, lactides, lactones and hydrolysable esters.
2. Superabsorbent material according to claim 1, in which the non-acidic compound is selected from cyclic acid anhydrides, lactides and lactones of γ - or δ -carboxylic acids.
3. Superabsorbent material according to claim 1 or 2, in which the non-acidic compound is selected from maleic anhydride, succinic anhydride, lactide, glycolide, gluconolactone and glucuronolactone.
4. Superabsorbent material according to any one of the preceding claims, in which said non-acidic compound is present in an amount of 1-20 wt.% with respect to the weight of the superabsorbent material.
5. Superabsorbent material according to any one of the preceding claims, in which the non-acidic compound is homogeneously divided in the superabsorbent material.
6. Superabsorbent material according to any one of the preceding claims, in which the non-acidic compound is chemically bound to the superabsorbent material.
7. Hygiene product such as a diaper, comprising a superabsorbent material according to any one of the preceding claims.

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Abstract

(58)

A superabsorbent material with enhanced odour control and control of bacterial growth comprises a non-acidic, alkali-neutralising compound selected from acid anhydrides, lactides, lactones and hydrolysable esters, especially cyclic acid anhydrides, lactides and lactones of γ - or δ -carboxylic acids. The superabsorbent material can be used in hygiene products such as diapers.

